him by the American Rolling Mill Co. Now Dr. Cushman contends that this analysis, and hence the opinions based upon it, is untrustworthy because it represents but a single sample; because the sample was of early manufacture; because it does not represent the present product of the American Rolling Mill Co. He does not object to the analysis because it is wrong. And yet the firm in whose defence Dr. Cushman so valiantly struggles quotes on pages 8 and 9 of its booklet "Public Opinion on American Ingot Iron," copyrighted in 1912, and distributed to the public as late as last July, these very pages, 114 and 115, of Dr. Friend's book, on which are given in full this analysis and opinions based upon it. If it is ethical for Dr. Cushman or the American Rolling Mill Co. to take advantage of an error (for which it is responsible) in a scientific book, and to print this as advertising matter and to place before the public what is not true, it surely is not a breach of ethics for me to print in a scientific journal a correction of this error and to state what is true.

Why limit professional ethics to scientific book reviews?

WILLIAM H. WALKER

THE INHERITANCE OF ACQUIRED PIGMENTATION

THE brief article on "The Inheritance of Skin Color" in SCIENCE for August 2, by Dr. H. E. Jordan, of the University of Virginia, contains among other matters the following speculation:

> The fact of the apparent histologic identity between brunette and mulatto skins; and the further fact that under protracted exposure to extremes of heat and sun the number of pigment granules is increased in white skin, indicates that pigmentation (dark skin) as evidenced in the negro is an instance of the inheritance of an acquired character. The least that makes a negro a negro is his dark skin. Life-guards in September are frequently almost as black. A negro is specifically such for mental perhaps more than for physical characteristics. . . .

Dr. Jordan certainly fares far afield in offering two opinions—(1) the transmission of an acquired character, (2) that a negro is a negro more for his mental than his physical characters, against all of the verifiable facts and experiments now available.

Although the peculiar fact of negro pigmentation and its origin can not be experimentally tested, the experiment of increasing and decreasing pigmentation by segregation is open to all of us. The work so voluminously before us on rats, mice, guinea-pigs, cattle, poultry and other animals are one hundred per cent. against Dr. Jordan's unfounded speculation of pigmentation (in the negro or in a blue mouse) as an instance of the acquired character afterwards inherited. Segregation in the dark African jungles has all the experimental proof in its favor.

That the negro is specifically a negro "for mental perhaps more than for physical characteristics" is another opinion not supported by the verifiable facts. The kinky hair, thick lips, pigmentation, extensive genitalia and prepuce, nasal formation, weight of skull, length and thickness of bones, and the other physical peculiarities of the African are, to put it mildly, as much the biometrician's, the anthropologist's as the layman's method of diagnosing the negro from another race. I should like to learn of the mental differences.

It seems to me unnecessary to discuss Dr. Jordan's opinion that the Italians, Spanish and Anglo-Saxon brunettes "may owe their pigmentation to negroid ancestry."

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SCIENTIFIC BOOKS

Theoretische Astronomie. Von W. KLINKERFUES. Dritte verbesserte und vermehrte Ausgabe, bearbeitet von Professor Dr. H. BUCHHOLZ. XXXVIII., 1067 u. 12 S. 4°. Mit 67 Abbild. In stark. Leinenband 50 M. Verlag von Friedr. Vieweg & Sohn in Braunschweig.

The first edition of Klinkerfues's "Theoretische Astronomie" appeared in the year 1870, shortly after the publication of the classical treatises of Watson and Oppolzer, and in the intervening years has been an indispensable source of information to those in-

terested in the computational field of astronomy.

A second edition, rewritten and enlarged under the editorship of Professor Buchholz, appeared in 1899; and the third edition, edited again by Professor Buchholz, has grown by the addition of one hundred and fifty pages to such large proportions that the volume is both bulky and heavy. An eleven-hundred-page book can not be handled conveniently, and a continued use of the book will put its binding to a severe test. The press-work is all that could be desired and the diagrams are excellent.

The computational field of astronomy—perhaps we might say the book-keeping, or auditing department—has for some peculiar reason appropriated the title of "theoretical astronomy." It is not peculiarly theoretical; rather it is the link which binds together the worker in celestial mechanics and the observing astronomer. To the observing astronomer it brings the results of theory; and as the observing astronomers are the "practical" astronomers, and are the more numerous, perhaps this misnomer can be charged to them. At any rate, a science so old and so exact as astronomy should be a little more careful with its titles. The "practical" astronomers are no more practical than other astronomers, and the computing astronomer has no monopoly of the theoretical aspect of the subject. And so we warn the uninitiated not to anticipate in this book an account of that delightful body of theory which constitutes the science of astronomy. It is, on the contrary, an exhaustive treatise by an auditor explaining in detail the best methods of making up the astronomical accounts.

The subject matter of the volume is divided into nine parts and subdivided into one hundred and thirty-three "Vorlesungen." The topics treated are: I., Calculation of the Position of a Celestial Object from its Orbital Elements; II., Calculation of an Orbit from Given Observations; III., Determination of the Parabolic Orbits of Comets; IV., Determination of Elliptic Orbits; V., Determination of Elliptic Orbits from Four Observations, Only Three of Which are Complete; VI., On Mechanical Quadrature and the Methods of Special Perturbations; VII., Calculation of an Orbit from Many Observations According to the Methods of Least Squares; VIII., Calculation of Double Star Orbits; IX., On the Determination of the Orbits of Meteors; Supplement I., Tables; Supplement II., Leuchner's Method of Computing Orbits.

The principal additions which have been made since the second edition are contained in Part IV., in the tables, and in Supplement II., all of which relate to Leuschner's method of computing orbits. Of the three essentially distinct methods of computing orbits, viz., the methods of Gauss, Laplace and Gibbs, the one of Gauss, with various modifications, has been the one generally employed. The method of Laplace contained computational difficulties which have precluded its use.

Recognizing the theoretical advantages of Laplace's method, and also its computational disadvantages, Professor A. O. Leuschner, of the University of California, has given a great deal of study to its improvement. As a result of his work he has evolved a method which he has designated "The Short Method" (an unfortunate title for various reasons). Leuschner's method, with the aid of the tables he has constructed for it, is decidedly practical, and we are glad to see an adequate account of it given in this new edition of Klinkerfues's "Theoretische Astronomie."

We look in vain, however, for a valuable improvement to Gauss's method given in 1901 by Professor F. R. Moulton, of the University of Chicago.[1] After the heliocentric distances have been determined there are difficulties, both theoretical and practical, according to Gauss, in the determination of the elements a, e, ω. Not only is the method of Professor Moulton theoretically more direct than that of Gauss but it is computationally much more simple; moreover, it makes no assumption as to the species of the conic.

In the way of a minor error we notice that the formula for parabolic orbits,

[1] *Astronomical Journal*, No. 510.

$$(r_1 + r_2 + s)^{3/2} \mp (r_1 + r_2 - s)^{3/2} = 6\kappa(t_2 - t_1),$$

is ascribed to Lambert. Long ago, Tisserand called attention in his "Mécanique Céleste" to the fact that this formula was first given by Euler. To Lambert is due the corresponding formula for elliptic orbits.

In so large a volume, containing so much standard material, it is impossible to enter much into details. Nearly all the methods described are abundantly illustrated with numerical examples. As the text itself is clear and the author's style nearly always good, there would seem to be no reason why any one with the proper mathematical equipment should experience any difficulty in understanding it, which can not be said of either Watson or Oppolzer. Without doubt, it is the most valuable work on "Computational Astronomy" which we have.

W. D. MACMILLAN

Modern Microscopy. A Handbook for Beginners and Students. By M. I. CROSS and MARTIN J. COLE, Lecturer in Histology in Cook's School of Anatomy. Fourth edition, revised and enlarged, with chapters on special subjects by various writers. Chicago, Chicago Medical Book Co. 1912.

Time was when "microscopy" had a distinct place in the range of the sciences. This was, however, before the day when the microscope had become an instrument so subordinated to the scientific branches in which it is largely used. That time was marked by a lively curiosity in the world of the very small which expressed itself in the establishment of microscopical clubs, societies, journals, etc.

Popular interest in the "microscope and its revelations" seems to have been largely lost at the present day, perhaps as the detailed results of its use have become more public property. This change of attitude which seems to the reviewer a real one is for many reasons to be deplored, so that such a book as the one whose title is given above should have a distinct place as a guide book for amateur microscopists—but only as such. Attempting to cover, as it does, practically the entire field in which the microscope is applied, it necessarily falls short as a book for professional workers or serious students in the various fields.

The book is clearly written, fairly illustrated with a selection of figures, in general well chosen. The formulas of preserving fluids, stains and similar prescriptions are standard, although the selection often does not reveal a thorough familiarity with the more recent advances in the field.

Five chapters constitute Part I. on the Microscope and its Accessories. Part II., fifteen chapters, is devoted to the technique of animal and vegetable examination by means of the microscope, together with chapters on mounting entomological specimens, crystals, diatomes, etc. Part III. comprises special chapters by special writers on The Petrological Microscope, Rotifers, Mites, Foraminifera, Mosses and Liverworts, The Microscope and Nature Study and the Microscopy of Foods.

The book is therefore believed to have its place as a means of arousing and encouraging the interest of the layman in the world around him.

As a book for use in America, by Americans, however, it is believed that it would meet the demands that will be made of it better if it were to take some recognition of the excellent microscopes put out by such firms as The Bausch & Lomb Optical Company and the Spencer Lens Company among others. The special chapters, furthermore, deal with a peculiarly English fauna.

B. F. KINGSBURY

NUMBER OF SPECIES OF LIVING VERTEBRATES

RECENTLY I have had occasion to make an estimate of the number of known species of living vertebrates. After consultation with a number of specialists, the figures below have been fixed on as a reasonably close approximation to the truth. Thinking these estimates may be of interest to others, I send them to SCIENCE to publish for what they are worth. Such figures can not, of course, be accurate if for no other reasons than that in compiling them no attempt has been made to discriminate between forms described as species or as